PERFORMANCE MADE SMARTER

## 2-wire HART 7 temperature transmitter

# 5437A

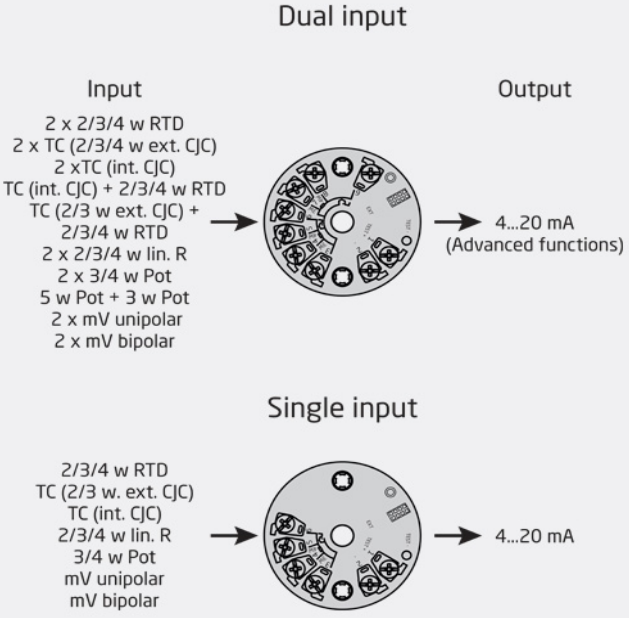
- RTD, TC, potentiometer, linear resistance and bipolar mV input
- Single or true dual inputs with sensor redundancy and drift detection
- Wide ambient operating temperature of -50 to +85°C
- Total accuracy from 0.014%
- 2.5 kVAC galvanic isolation
- Full assessment to IEC61508 : 2010 for use in SIL 2/3 applications

**Application**
- Temperature measurement of a wide range of TC and RTD types.
- Conversion of wide span linear resistance and potentiometer inputs.
- Conversion of bipolar mV signals to 4...20 mA.
- Integration into asset management schemes.
- Critical applications requiring superior accuracy and/or sensor redundancy and drift detection.

**Technical characteristics**
- True dual input transmitter. High density 7-terminal design accepts the widest range of dual input combinations.
- Sensor redundancy - output automatically switches to secondary sensor in event of primary sensor failure, maintaining uptime.
- Sensor drift detection - alerts when sensor differential exceeds user-defined limits, for maintenance optimization.
- Dynamic variable mapping for process data in addition to the primary variable e.g. dual input features such as average, differential and min./max. tracking.
- Groundbreaking digital and analog signal accuracy over full input span and ambient conditions.
- Extensive sensor matching including Callendar Van Dusen and custom linearizations.
- Programmable input limits and runtime metering ensure maximum process traceability and sensor out of range protection.
- IEC 61508 : 2010 full assessement up to SIL 3 together with enhanced EMC Functional Safety testing to IEC 61236-3-1.
- 5437xxSx is suitable for the use in systems up to Performance Level “d” according to ISO-13849.
- Meets NAMUR NE21, NE43, NE44, NE89, NE95, NE130 and NE107 compliant diagnostics information.

**Mounting / installation**
- For DIN form B sensor head mounting.
- Configuration via standard HART communication interfaces or by PR 5909 Loop Link.
- The 5437A can be mounted in zone 2 and 22 / Class I, Division 2, Groups A, B, C, D.

## Applications



**Order:**

| Type | Inputs | | SIL approval | | Marine approval | |
|---|---|---|---|---|---|---|
| 5437A | Single input (4 terminals) | : 1 | SIL | : S | Yes | : M |
| | Dual input (7 terminals) | : 2 | No SIL | : - | No | : - |

## Environmental Conditions

| | |
|---|---|
| Operating temperature | -50°C to +85°C (standard) |
| Operating temperature | -40°C to +80°C (SIL) |
| Storage temperature | -50°C to +85°C |
| Calibration temperature | 23...25°C |
| Relative humidity | < 99% RH (non-cond.) |
| Protection degree (encl./terminal) | IP68 / IP00 |

## Mechanical specifications

| | |
|---|---|
| Dimensions | Ø 44 x 21.45 mm |
| Center hole diameter | Ø 6.35 mm / ¼ in |
| Weight approx. | 50 g |
| Wire size | 1 x 1.5 $mm^2$ stranded wire |
| Screw terminal torque | 0.4 Nm |
| Vibration | IEC 60068-2-6 |
| 2...25 Hz | ±1.6 mm |
| 25...100 Hz | ±4 g |

## Common specifications

**Supply**

| | |
|---|---|
| Supply voltage | 7.5*...48** VDC |
| Internal power dissipation | ≤ 850 mW |
| Additional min. supply voltage when using test terminals | 0.8 V |
| Min. load resistance at >37 V supply | (Vsupply – 37) / 23 mA |

**Isolation voltage**

| | |
|---|---|
| Isolation voltage, test / working | 2.5 kVAC / 55 VAC |

**Response time**

| | |
|---|---|
| Response time | 75 ms |
| Programmable damping | 0...60 s |
| Polarity protection | All inputs and outputs |
| Write protection | Jumper or software |
| Warm-up time | < 5 min. |
| Start-up time | < 2.75 s |
| Programming | Loop Link & HART |
| Signal / noise ratio | > 60 dB |
| Long-term stability, better than | ±0.05% of span / year (±0.18% of span / 5 years) |
| Signal dynamics, input | 24 bit |
| Signal dynamics, output | 18 bit |
| Effect of supply voltage change | < 0.005% of span / VDC |
| Accuracy | See manual for details |
| EMC immunity influence | < ±0.1% of span |
| Extended EMC immunity: NAMUR NE21, A criterion, burst | < ±1% |

## Input specifications

**RTD input**

| | |
|---|---|
| RTD type | Pt10...10000, Ni10...10000, Cu5...1000 |
| Cable resistance per wire | 50 Ω (max.) |
| Effect of sensor cable resistance (3-/4-wire) | < 0.002 Ω / Ω |
| Sensor current | < 0.15 mA |
| Sensor error detection | None, Shorted, Broken, Shorted or Broken |

**TC input**

| | |
|---|---|
| Thermocouple type | B, E, J, K, L, N, R, S, T, U, W3, W5, LR |
| Cold junction compensation (CJC) | Constant, internal or external via a Pt100 or Ni100 sensor |
| Sensor error detection | None, Shorted, Broken, Shorted or Broken |

**Linear resistance input**

| | |
|---|---|
| Measurement range / min. range (span) | 0 Ω...100 kΩ / 25 Ω |
| Cable resistance per wire (max.) | 50 Ω |
| Sensor current | < 0.15 mA |
| Sensor error detection | None, Broken |

**Potentiometer input**

| | |
|---|---|
| Potentiometer min....max | 10 Ω...100 kΩ |
| Measurement range / min. range (span) | 0...100% / 10% |
| Cable resistance per wire (max.) | 50 Ω |
| Sensor current | < 0.15 mA |
| Sensor error detection | None, Shorted, Broken, Shorted or Broken |

**mV input**

| | |
|---|---|
| Measurement range | -800...+800 mV (bipolar) |
| Measurement range | -100 to 1700 mV |
| Min. measurement range (span) | 2.5 mV |
| Input resistance | 10 MΩ |
| Sensor error detection | None, Broken |

## Output specifications

**Common output specifications**

| | |
|---|---|
| Normal range, programmable | 3.8...20.5 / 20.5...3.8 mA |
| Extended range (output limits), programmable | 3.5...23 / 23...3.5 mA |
| Updating time | 10 ms |
| Load (@ current output) | ≤ (Vsupply -7.5)/0.023 [Ω] |
| Load stability | < 0.01% of span / 100 Ω |
| Sensor error indication | Programmable 3.5…23 mA |
| NAMUR NE 43 Upscale/Downscale | > 21 mA / < 3.6 mA |
| HART protocol revisions | HART 7 and HART 5 |

## Observed authority requirements

| | |
|---|---|
| EMC | 2014/30/EU & UK SI 2016/1091 |
| ATEX | 2014/34/EU & UK SI 2016/1107 |
| RoHS | 2011/65/EU & UK SI 2012/3032 |
| EAC | TR-CU 020/2011 |
| EAC Ex | TR-CU 012/2011 |

## Approvals

| | |
|---|---|
| ATEX | DEKRA 18ATEX0135X |
| IECEx | IECEx DEK. 16.0029X |
| CSA | CSA 16.70066266 |
| c FM us | FM16US0287X / FM16CA0146X |
| INMETRO | DEKRA 23.0002X |
| NEPSI | GYJ23.1227X |
| EAC Ex | RU C-DK.GB.98.V.00192 |
| EU RO MR Type Approval | MRA0000023 |
| SIL | SIL 2 / SIL 3 certified & fully assessed acc. to IEC 61508 |

## NB

| | |
|---|---|
| NAMUR NE95 report | Please contact us |
| * / ** | See manual for details |

PERFORMANCE MADE SMARTER

## 2-wire HART 7 temperature transmitter

# 5437B

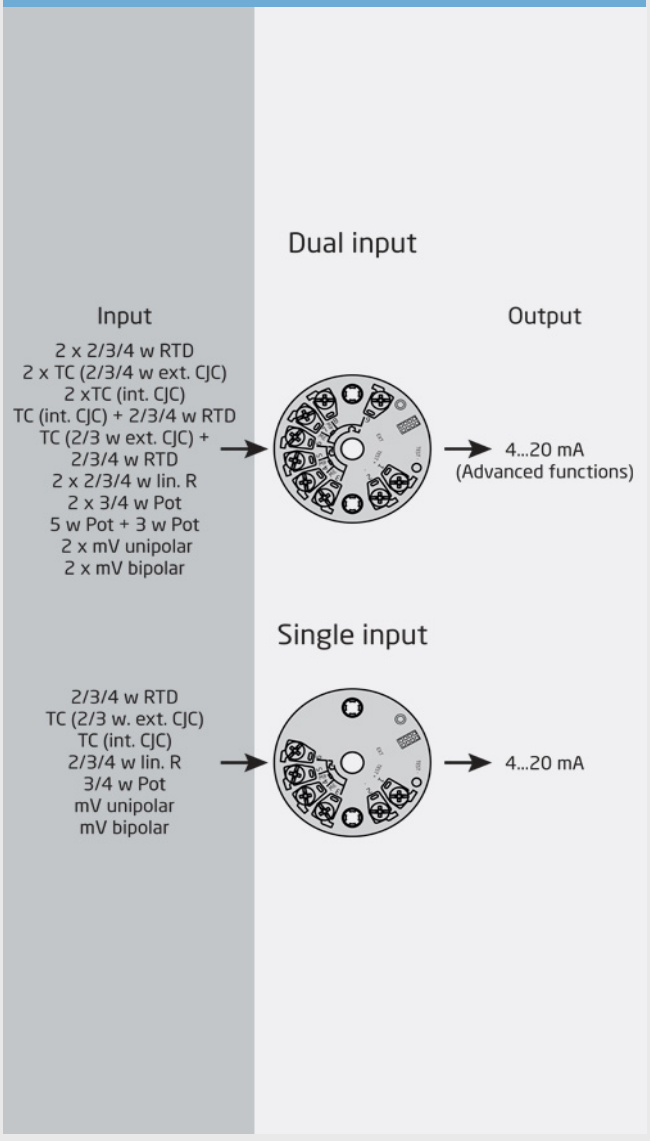
- RTD, TC, potentiometer, linear resistance and bipolar mV input
- Single or true dual inputs with sensor redundancy and drift detection
- Wide ambient operating temperature of -50 to +85°C
- Total accuracy from 0.014%
- 2.5 kVAC galvanic isolation
- Full assessment to IEC61508 : 2010 up to SIL 2/3

**Application**
- Temperature measurement of a wide range of TC and RTD types.
- Conversion of wide span linear resistance and potentiometer inputs.
- Conversion of bipolar mV signals to 4...20 mA.
- Integration into asset management schemes.
- Critical applications requiring superior accuracy and/or sensor redundancy and drift detection.

**Technical characteristics**
- True dual input transmitter. High density 7-terminal design accepts the widest range of dual input combinations.
- Sensor redundancy - output automatically switches to secondary sensor in event of primary sensor failure, maintaining uptime.
- Sensor drift detection - alerts when sensor differential exceeds user-defined limits, for maintenance optimization.
- Dynamic variable mapping for process data in addition to the primary variable e.g. dual input features such as average, differential and min./max. tracking.
- Groundbreaking digital and analog signal accuracy over full input span and ambient conditions.
- Extensive sensor matching including Callendar Van Dusen and custom linearizations.
- Programmable input limits with runtime metering ensure maximum process traceability and sensor out of range protection.
- IEC 61508 : 2010 full assessment up to SIL 3 together with enhanced EMC Functional Safety testing to IEC 61236-3-1.
- 5437xxSx is suitable for the use in systems up to Performance Level “d” according to ISO-13849.
- Meets NAMUR NE21, NE43, NE44, NE89, NE95, NE130 and NE107 compliant diagnostics information.

**Mounting / installation**
- For DIN form B sensor head mounting.
- Configuration via standard HART communication interfaces or by PR 5909 Loop Link.
- The 5437B can be mounted in zone 0, 1, 2 and zone 21, 22 including M1.

**Applications**



**Order:**

| Type | Inputs | | SIL approval | | Marine approval | |
|---|---|---|---|---|---|---|
| 5437B | Single input (4 terminals) | : 1 | SIL | : S | Yes | : M |
| | Dual input (7 terminals) | : 2 | No SIL | : - | No | : - |

## Environmental Conditions

| | |
|---|---|
| Operating temperature | -50°C to +85°C (standard) |
| Operating temperature | -40°C to +80°C (SIL) |
| Storage temperature | -50°C to +85°C |
| Calibration temperature | 23...25°C |
| Relative humidity | < 99% RH (non-cond.) |
| Protection degree (encl./terminal) | IP68 / IP00 |

## Mechanical specifications

| | |
|---|---|
| Dimensions | Ø 44 x 21.45 mm |
| Center hole diameter | Ø 6.35 mm / ¼ in |
| Weight approx. | 50 g |
| Wire size | 1 x 1.5 $mm^2$ stranded wire |
| Screw terminal torque | 0.4 Nm |
| Vibration | IEC 60068-2-6 |
| 2...25 Hz | ±1.6 mm |
| 25...100 Hz | ±4 g |

## Common specifications

**Supply**

| | |
|---|---|
| Supply voltage | 7.5*...30** VDC |
| Internal power dissipation | ≤ 850 mW |
| Additional min. supply voltage when using test terminals | 0.8 V |
| Min. load resistance at >37 V supply | (Vsupply – 37) / 23 mA |

**Isolation voltage**

| | |
|---|---|
| Isolation voltage, test / working | 2.5 kVAC / 42 VAC |

**Response time**

| | |
|---|---|
| Response time | 75 ms |
| Programmable damping | 0...60 s |
| Polarity protection | All inputs and outputs |
| Warm-up time | < 5 min. |
| Start-up time | < 2.75 s |
| Programming | Loop Link & HART |
| Write protection | Jumper or software |
| Signal / noise ratio | > 60 dB |
| Long-term stability, better than | ±0.05% of span / year (±0.18% of span / 5 years) |
| Signal dynamics, input | 24 bit |
| Signal dynamics, output | 18 bit |
| Effect of supply voltage change | < 0.005% of span / VDC |
| Accuracy | See manual for details |
| EMC immunity influence | < ±0.1% of span |
| Extended EMC immunity: NAMUR NE21, A criterion, burst | < ±1% |

## Input specifications

**RTD input**

| | |
|---|---|
| RTD type | Pt10...10000, Ni10...10000, Cu5...1000 |
| Cable resistance per wire | 50 Ω (max.) |
| Effect of sensor cable resistance (3-/4-wire) | < 0.002 Ω / Ω |
| Sensor current | < 0.15 mA |
| Sensor error detection | None, Shorted, Broken, Shorted or Broken |

**TC input**

| | |
|---|---|
| Thermocouple type | B, E, J, K, L, N, R, S, T, U, W3, W5, LR |
| Cold junction compensation (CJC) | Constant, internal or external via a Pt100 or Ni100 sensor |
| Sensor error detection | None, Shorted, Broken, Shorted or Broken |

**Linear resistance input**

| | |
|---|---|
| Measurement range / min. range (span) | 0 Ω...100 kΩ / 25 Ω |
| Cable resistance per wire (max.) | 50 Ω |
| Sensor current | < 0.15 mA |
| Sensor error detection | None, Broken |

**Potentiometer input**

| | |
|---|---|
| Potentiometer min....max | 10 Ω...100 kΩ |
| Measurement range / min. range (span) | 0...100% / 10% |
| Cable resistance per wire (max.) | 50 Ω |
| Sensor current | < 0.15 mA |
| Sensor error detection | None, Shorted, Broken, Shorted or Broken |

**mV input**

| | |
|---|---|
| Measurement range | -800...+800 mV (bipolar) |
| Measurement range | -100 to 1700 mV |
| Min. measurement range (span) | 2.5 mV |
| Input resistance | 10 MΩ |
| Sensor error detection | None, Broken |

## Output specifications

**Common output specifications**

| | |
|---|---|
| Normal range, programmable | 3.8...20.5 / 20.5...3.8 mA |
| Extended range (output limits), programmable | 3.5...23 / 23...3.5 mA |
| Updating time | 10 ms |
| Load (@ current output) | ≤ (Vsupply -7.5)/0.023 [Ω] |
| Load stability | < 0.01% of span / 100 Ω |
| Sensor error indication | Programmable 3.5…23 mA |
| NAMUR NE 43 Upscale/Downscale | > 21 mA / < 3.6 mA |
| HART protocol revisions | HART 7 and HART 5 |

## Observed authority requirements

| | |
|---|---|
| EMC | 2014/30/EU & UK SI 2016/1091 |
| ATEX | 2014/34/EU & UK SI 2016/1107 |
| RoHS | 2011/65/EU & UK SI 2012/3032 |
| EAC | TR-CU 020/2011 |

## Approvals

| | |
|---|---|
| ATEX | DEKRA 16ATEX0047X |
| EU RO MR Type Approval | MRA0000023 |
| SIL | SIL 2 / SIL 3 certified & fully assessed acc. to IEC 61508 |

## NB

| | |
|---|---|
| NAMUR NE95 report | Please contact us |
| * / ** | See manual for details |

PERFORMANCE MADE SMARTER

## 2-wire HART 7 temperature transmitter

# 5437D

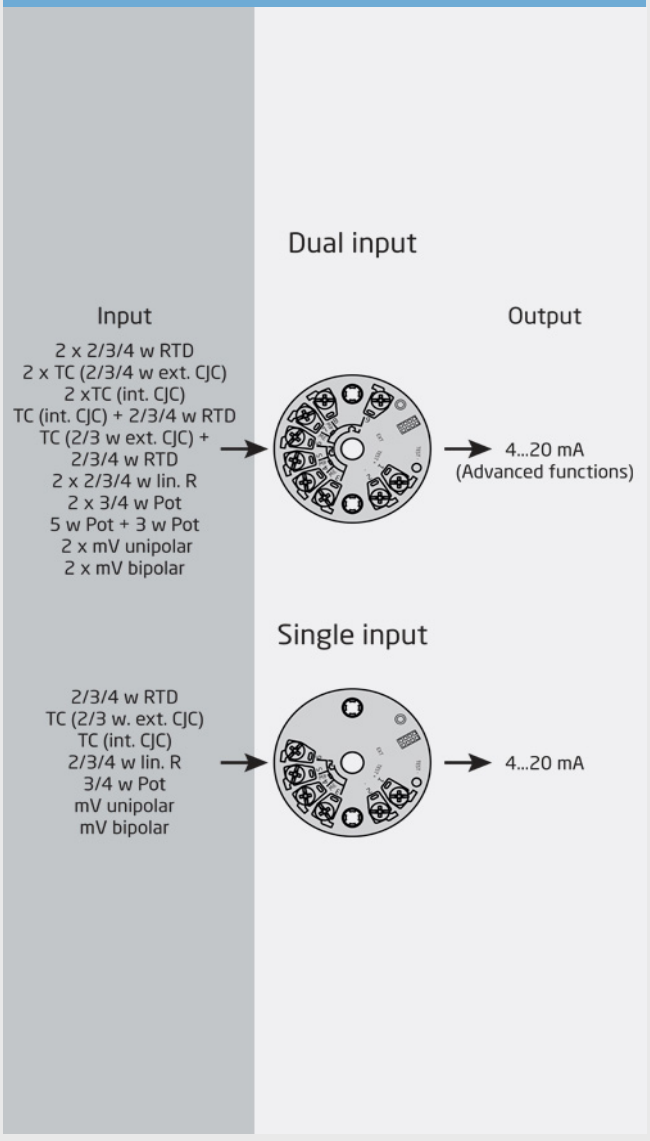
- RTD, TC, potentiometer, linear resistance and bipolar mV input
- Single or true dual inputs with sensor redundancy and drift detection
- Wide ambient operating temperature of -50 to +85°C
- Total accuracy from 0.014%
- 2.5 kVAC galvanic isolation
- Full assessment to IEC61508 : 2010 up to SIL 2/3

**Application**
- Temperature measurement of a wide range of TC and RTD types.
- Conversion of wide span linear resistance and potentiometer inputs.
- Conversion of bipolar mV signals to 4...20 mA.
- Integration into asset management schemes.
- Critical applications requiring superior accuracy and/or sensor redundancy and drift detection.

**Technical characteristics**
- True dual input transmitter. High density 7-terminal design accepts the widest range of dual input combinations.
- Sensor redundancy - output automatically switches to secondary sensor in event of primary sensor failure, maintaining uptime.
- Sensor drift detection - alerts when sensor differential exceeds user-defined limits, for maintenance optimization.
- Dynamic variable mapping for process data in addition to the primary variable e.g. dual input features such as average, differential and min./max. tracking.
- Groundbreaking digital and analog signal accuracy over full input span and ambient conditions.
- Extensive sensor matching including Callendar Van Dusen and custom linearizations.
- Programmable input limits with runtime metering ensure maximum process traceability and sensor out of range protection.
- IEC 61508 : 2010 full assessment up to SIL 3 together with enhanced EMC Functional Safety testing to IEC 61236-3-1.
- 5437xxSx is suitable for the use in systems up to Performance Level “d” according to ISO-13849.
- Meets NAMUR NE21, NE43, NE44, NE89, NE95, NE130 and NE107 compliant diagnostics information.

**Mounting / installation**
- For DIN form B sensor head mounting.
- Configuration via standard HART communication interfaces or by PR 5909 Loop Link.
- The 5437D can be mounted in zone 0, 1, 2 and zone 21, 22 including M1 / Class I, Division 1, Groups A, B, C, D.

**Applications**



Order:

| Type | Inputs | | SIL approval | | Marine approval | |
|---|---|---|---|---|---|---|
| 5437D | Single input (4 terminals) | : 1 | SIL | : S | Yes | : M |
| | Dual input (7 terminals) | : 2 | No SIL | : - | No | : - |

## Environmental Conditions

| | |
|---|---|
| Operating temperature | -50°C to +85°C (standard) |
| Operating temperature | -40°C to +80°C (SIL) |
| Storage temperature | -50°C to +85°C |
| Calibration temperature | 23...25°C |
| Relative humidity | < 99% RH (non-cond.) |
| Protection degree (encl./terminal) | IP68 / IP00 |

## Mechanical specifications

| | |
|---|---|
| Dimensions | Ø 44 x 21.45 mm |
| Center hole diameter | Ø 6.35 mm / ¼ in |
| Weight approx. | 50 g |
| Wire size | 1 x 1.5 $mm^2$ stranded wire |
| Screw terminal torque | 0.4 Nm |
| Vibration | IEC 60068-2-6 |
| 2...25 Hz | ±1.6 mm |
| 25...100 Hz | ±4 g |

## Common specifications

**Supply**

| | |
|---|---|
| Supply voltage | 7.5*...30** VDC |
| Internal power dissipation | ≤ 850 mW |
| Additional min. supply voltage when using test terminals | 0.8 V |
| Min. load resistance at >37 V supply | (Vsupply – 37) / 23 mA |

**Isolation voltage**

| | |
|---|---|
| Isolation voltage, test / working | 2.5 kVAC / 42 VAC |

**Response time**

| | |
|---|---|
| Response time | 75 ms |
| Programmable damping | 0...60 s |
| Polarity protection | All inputs and outputs |
| Warm-up time | < 5 min. |
| Start-up time | < 2.75 s |
| Programming | Loop Link & HART |
| Write protection | Jumper or software |
| Signal / noise ratio | > 60 dB |
| Long-term stability, better than | ±0.05% of span / year (±0.18% of span / 5 years) |
| Signal dynamics, input | 24 bit |
| Signal dynamics, output | 18 bit |
| Effect of supply voltage change | < 0.005% of span / VDC |
| Accuracy | See manual for details |
| EMC immunity influence | < ±0.1% of span |
| Extended EMC immunity: NAMUR NE21, A criterion, burst | < ±1% |

## Input specifications

**RTD input**

| | |
|---|---|
| RTD type | Pt10...10000, Ni10...10000, Cu5...1000 |
| Cable resistance per wire | 50 Ω (max.) |
| Effect of sensor cable resistance (3-/4-wire) | < 0.002 Ω / Ω |
| Sensor current | < 0.15 mA |
| Sensor error detection | None, Shorted, Broken, Shorted or Broken |

**TC input**

| | |
|---|---|
| Thermocouple type | B, E, J, K, L, N, R, S, T, U, W3, W5, LR |
| Cold junction compensation (CJC) | Constant, internal or external via a Pt100 or Ni100 sensor |
| Sensor error detection | None, Shorted, Broken, Shorted or Broken |

**Linear resistance input**

| | |
|---|---|
| Measurement range / min. range (span) | 0 Ω...100 kΩ / 25 Ω |
| Cable resistance per wire (max.) | 50 Ω |
| Sensor current | < 0.15 mA |
| Sensor error detection | None, Broken |

**Potentiometer input**

| | |
|---|---|
| Potentiometer min....max | 10 Ω...100 kΩ |
| Measurement range / min. range (span) | 0...100% / 10% |
| Cable resistance per wire (max.) | 50 Ω |
| Sensor current | < 0.15 mA |
| Sensor error detection | None, Shorted, Broken, Shorted or Broken |

**mV input**

| | |
|---|---|
| Measurement range | -800...+800 mV (bipolar) |
| Measurement range | -100 to 1700 mV |
| Min. measurement range (span) | 2.5 mV |
| Input resistance | 10 MΩ |
| Sensor error detection | None, Broken |

## Output specifications

**Common output specifications**

| | |
|---|---|
| Normal range, programmable | 3.8...20.5 / 20.5...3.8 mA |
| Extended range (output limits), programmable | 3.5...23 / 23...3.5 mA |
| Updating time | 10 ms |
| Load (@ current output) | ≤ (Vsupply -7.5)/0.023 [Ω] |
| Load stability | < 0.01% of span / 100 Ω |
| Sensor error indication | Programmable 3.5…23 mA |
| NAMUR NE 43 Upscale/Downscale | > 21 mA / < 3.6 mA |
| HART protocol revisions | HART 7 and HART 5 |

## Observed authority requirements

| | |
|---|---|
| EMC | 2014/30/EU & UK SI 2016/1091 |
| ATEX | 2014/34/EU & UK SI 2016/1107 |
| RoHS | 2011/65/EU & UK SI 2012/3032 |
| EAC | TR-CU 020/2011 |
| EAC Ex | TR-CU 012/2011 |

## Approvals

| | |
|---|---|
| ATEX | DEKRA 16ATEX0047X |
| IECEx | IECEx DEK. 16.0029X |
| CSA | CSA 16.70066266 |
| c FM us | FM16US0287X / FM16CA0146X |
| INMETRO | DEKRA 23.0002X |
| NEPSI | GYJ23.1227X |
| EAC Ex | RU C-DK.GB.98.V.00192 |
| EU RO MR Type Approval | MRA0000023 |
| SIL | SIL 2 / SIL 3 certified & fully assessed acc. to IEC 61508 |

## NB

| | |
|---|---|
| NAMUR NE95 report | Please contact us |
| * / ** | See manual for details |